

**FINAL
FIELD SAMPLING PLAN FOR
SURFACE WATER AND SEDIMENT
OF THE
CAMP EDWARDS IMPACT AREA
GROUNDWATER QUALITY STUDY**

**MASSACHUSETTS MILITARY RESERVATION
CAPE COD, MASSACHUSETTS**

**Prepared for
NATIONAL GUARD BUREAU
ARLINGTON, VIRGINIA**

Prepared by

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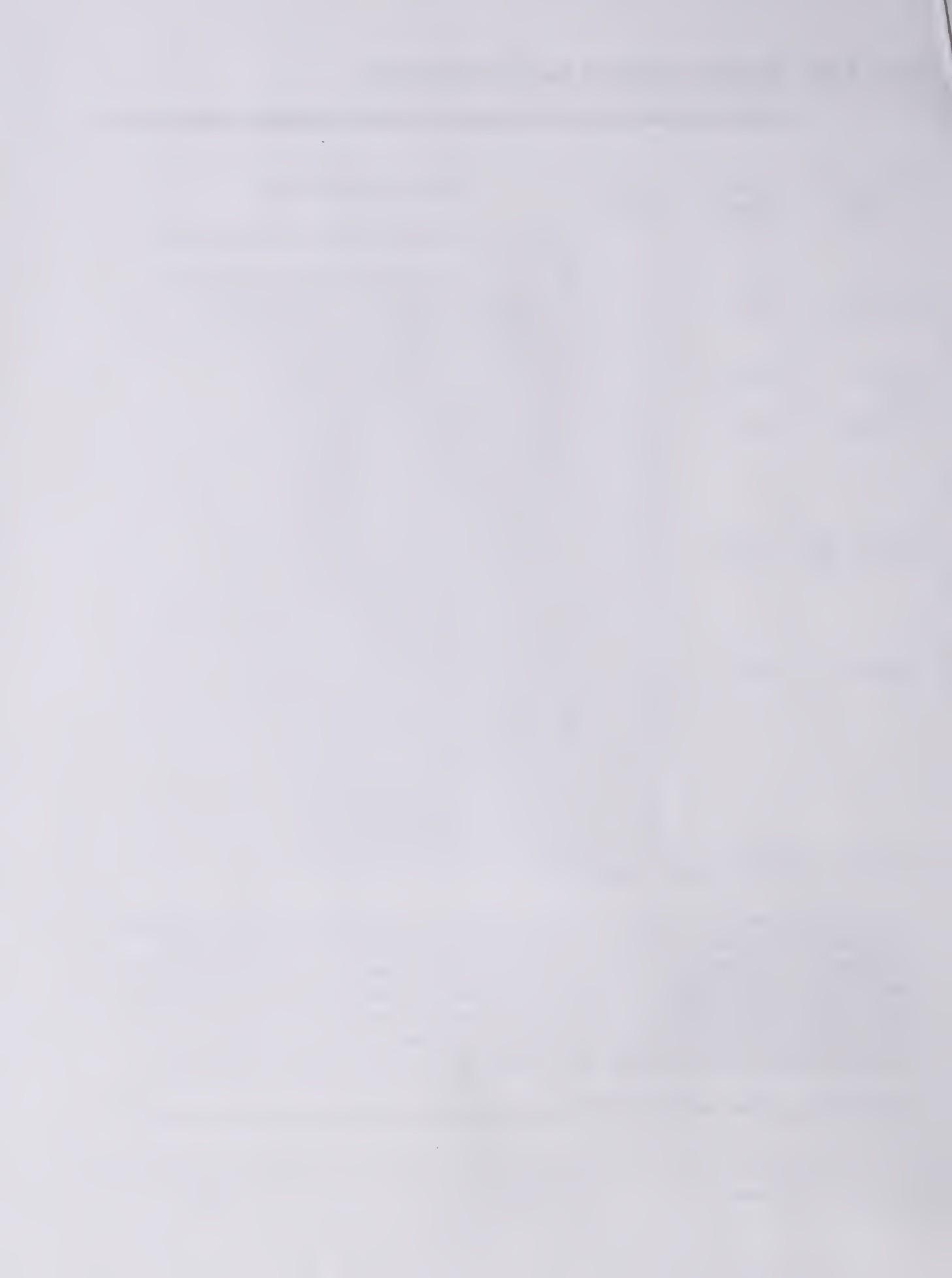
Final FSP Surface Water and Sediment

Surface Water Body	Figure Number	Sample Location	Description/Rationale
		26F	Receives runoff from west near trails/transmission lines
		26G	Receives runoff from north near transmission lines
Snake Pond	A.8-15	33A	Downgradient of J-3 Wetland and MW-30S
		33B	Downgradient of J-3 Wetland and WT-13
		33C	Perimeter location SE of Bypass Bog
Raccoon Swamp	A.8-16	32A	Perimeter location (Background)
		32B	Perimeter location (Background)
Great Pond	A.8-17	39A	Perimeter location (Background)
		39B	Perimeter location (Background)
		39C	Perimeter location (Background)
		39D	Perimeter location (Background)
		39E	Perimeter location (Background)
Doughnut Pond	A.8-18	40A	Perimeter location (Background)
		40B	Perimeter location (Background)
		40C	Perimeter location (Background)
		40D	Perimeter location (Background)
		40E	Perimeter location (Background)
Upper Pond	A.8-19	43A	Perimeter location (Background)
		43B	Perimeter location (Background)
		43C	Perimeter location (Background)
		43D	Perimeter location (Background)
		43E	Perimeter location (Background)
		43F	Perimeter location (Background)
		43G	Perimeter location (Background)
		43H	Perimeter location (Background)

* = location for sampling only soil/sediment

Sample collection will be consistent with MMR SOPs, the Ogden Health and Safety Guidelines, Attachment A: Field Guide to High Explosives, and the EPA Standard Guide for Composite Sampling and Field Subsampling for Environmental Waste Management Activities (October 31, 1996). Every sediment sample with explosives detected by the colorimetric method will also be analyzed by EPA Method 8330. In addition to field samples identified in Table A.8-1, QA/QC samples will be collected as described in the Final Action Plan, Appendix A Quality Assurance/Quality Control Plan (July 1997), and the QA/QC Plan Addendum (August 1997).

The following protocol will be followed during surface water and sediment sampling at ponds



Final FSP Surface Water and Sediment

and swamps.

Surface Water Sampling

1. surface water will be collected prior to sediment sampling;
2. the sampler will enter the water downstream from the sample point and only if necessary;
3. the sample will be collected by submerging the sample containers
4. containers with preservative will be filled using a decontaminated stainless steel or glass container; and
5. Samples will be collected as listed in Table A.8-2.

Surface Water will be analyzed by the following.

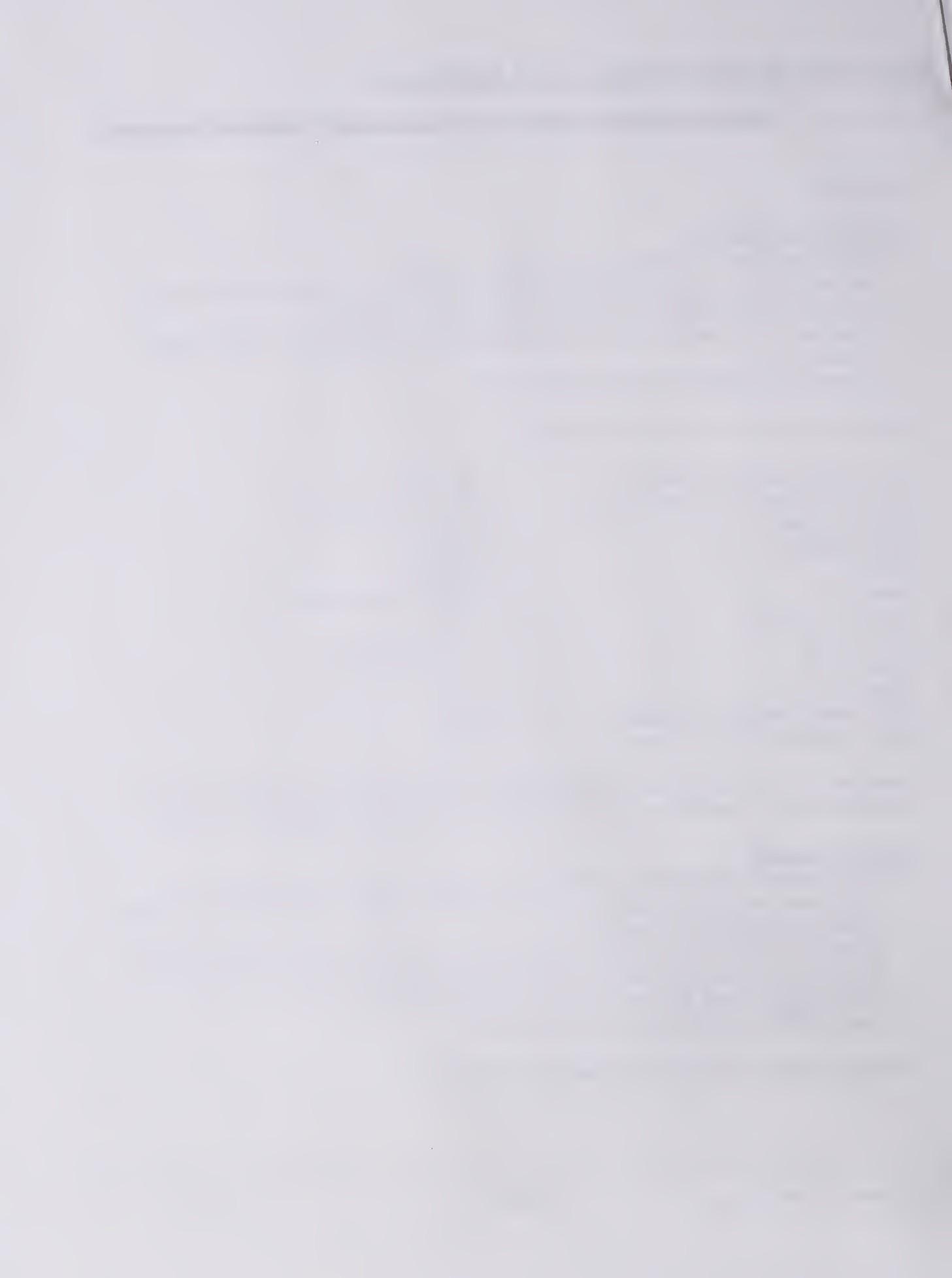
VOC (except background locations)	OLC 02.1
Explosives (except background locations)	EPA Method 8330
Metals & Cyanide	ILM04
Pesticides/PCBs	OLC 02.1
SVOC	OLC02.1
Herbicides	SW-846 Method 8151
Hardness as CaCO ₃	130.1
Phosphorous	365.2 (Modified)
Nitrate-Nitrite	353.2 (Modified)
Ammonia	350.2
MTBE (except background locations)	8021
EDB (except background locations)	504.1

Detection limits for these analyses are described in the Final Action Plan, Appendix A Quality Assurance/Quality Control Plan (July 1997), and the QA/QC Plan Addendum (August 1997).

Sediment Sampling

1. a 0-6" sediment sample will be collected from the same location as each surface water sample after removal of the surficial organic layer (leaves, twigs, bark, and root mass), using a decontaminated hand auger or trowel;
2. the sediment will be placed in a decontaminated bowl, water decanted or drained as needed to ensure a minimum of 30% solids, and homogenized (the VOC sample will be taken directly from the hand auger or trowel prior to homogenization); and
3. Samples will be collected as listed in Table A.8-3.

Sediment samples will be analyzed by the following methods.



Final FSP Surface Water and Sediment

Table A.8-2, continued

MMR Surface Water Samples			Parameters:																			
Location	MMR ID	EPA/Ogden ID	Pres.	Bottles	Explosives (EPA 8330)		Inorganics:		Other Analytes:		VOC		SVOC		PCB/Pest.		Herbicide		EDB		MTBE	
Little Halfway Pond	71SW31AXAX01XA	P31AAA		X	none	2*1LA	NaOH	1LP	Cyanide	X	HCl	3*40mL	VOC									
	71SW31BXAX01XA	P31BAA		X	none	2*1LA	X	none	Cl, SO4, Alk.	X	none	2*1LA	X	X	X	X	X	X	X	X	X	
	71SW26AXAX01XA	P26AAA		X	none	2*1LA	X	none	NO2/NO3, NH4, Phos.	X	none	2*1LA	X	X	X	X	X	X	X	X	X	
	71SW26BXAX01XA	P26BAA		X	none	2*1LA	X	none	HN03	X	none	2*1LA	X	X	X	X	X	X	X	X	X	
	71SW26CXAX01XA	P26CAA		X	none	2*1LA	X	none		X	none	2*1LA	X	X	X	X	X	X	X	X	X	
	71SW26DXAX01XA	P26DAA		X	none	2*1LA	X	none		X	none	2*1LA	X	X	X	X	X	X	X	X	X	
	71SW26EXAX01XA	P26EAA		X	none	2*1LA	X	none		X	none	2*1LA	X	X	X	X	X	X	X	X	X	
Cranberry Bog	71SW26FXAX01XA	P26FAA		X	none	2*1LA	X	none		X	none	2*1LA	X	X	X	X	X	X	X	X	X	
	71SW26GXAX01XA	P26GAA		X	none	2*1LA	X	none		X	none	2*1LA	X	X	X	X	X	X	X	X	X	
	71SW33AXAX01XA	P33AAA		X	none	2*1LA	X	none		X	none	2*1LA	X	X	X	X	X	X	X	X	X	
Snake Pond	71SW33BXAX01XA	P33BAA		X	none	2*1LA	X	none		X	none	2*1LA	X	X	X	X	X	X	X	X	X	
	71SW33CXAX01XA	P33CAA		X	none	2*1LA	X	none		X	none	2*1LA	X	X	X	X	X	X	X	X	X	
	71SW32AXAX01XA	P32AAA		X	none	2*1LA	X	none		X	none	2*1LA	X	X	X	X	X	X	X	X	X	
Raccoon Swamp	71SW32BXAX01XA	P32BAA		X	none	2*1LA	X	none		X	none	2*1LA	X	X	X	X	X	X	X	X	X	
	71SW39AXAX01XA	P39AAA					X	none		X	none		X	X	X							
Great Pond	71SW39BXAX01XA	P39BAA					X	none		X	none		X	X	X							
	71SW39CXAX01XA	P39CAA					X	none		X	none		X	X	X							
	71SW39DXAX01XA	P39DAA					X	none		X	none		X	X	X							
	71SW39EXAX01XA	P39EAA					X	none		X	none		X	X	X							
	71SW40AXAX01XA	P40AAA					X	none		X	none		X	X	X							
Doughnut Pond	71SW40BXAX01XA	P40BAA					X	none		X	none		X	X	X							
	71SW40CXAX01XA	P40CAA					X	none		X	none		X	X	X							
	71SW40DXAX01XA	P40DAA					X	none		X	none		X	X	X							
	71SW40EXAX01XA	P40EAA					X	none		X	none		X	X	X							
	71SW43AXAX01XA	P43AAA					X	none		X	none		X	X	X							
Upper Pond	71SW43BXAX01XA	P43BAA					X	none		X	none		X	X	X							
	71SW43CXAX01XA	P43CAA					X	none		X	none		X	X	X							
	71SW43DXAX01XA	P43DAA					X	none		X	none		X	X	X							
	71SW43EXAX01XA	P43EAA					X	none		X	none		X	X	X							
	71SW43FXAX01XA	P43FAA					X	none		X	none		X	X	X							
	71SW43GXAX01XA	P43GAA					X	none		X	none		X	X	X							
	71SW43HXAX01XA	P43HAA					X	none		X	none		X	X	X							

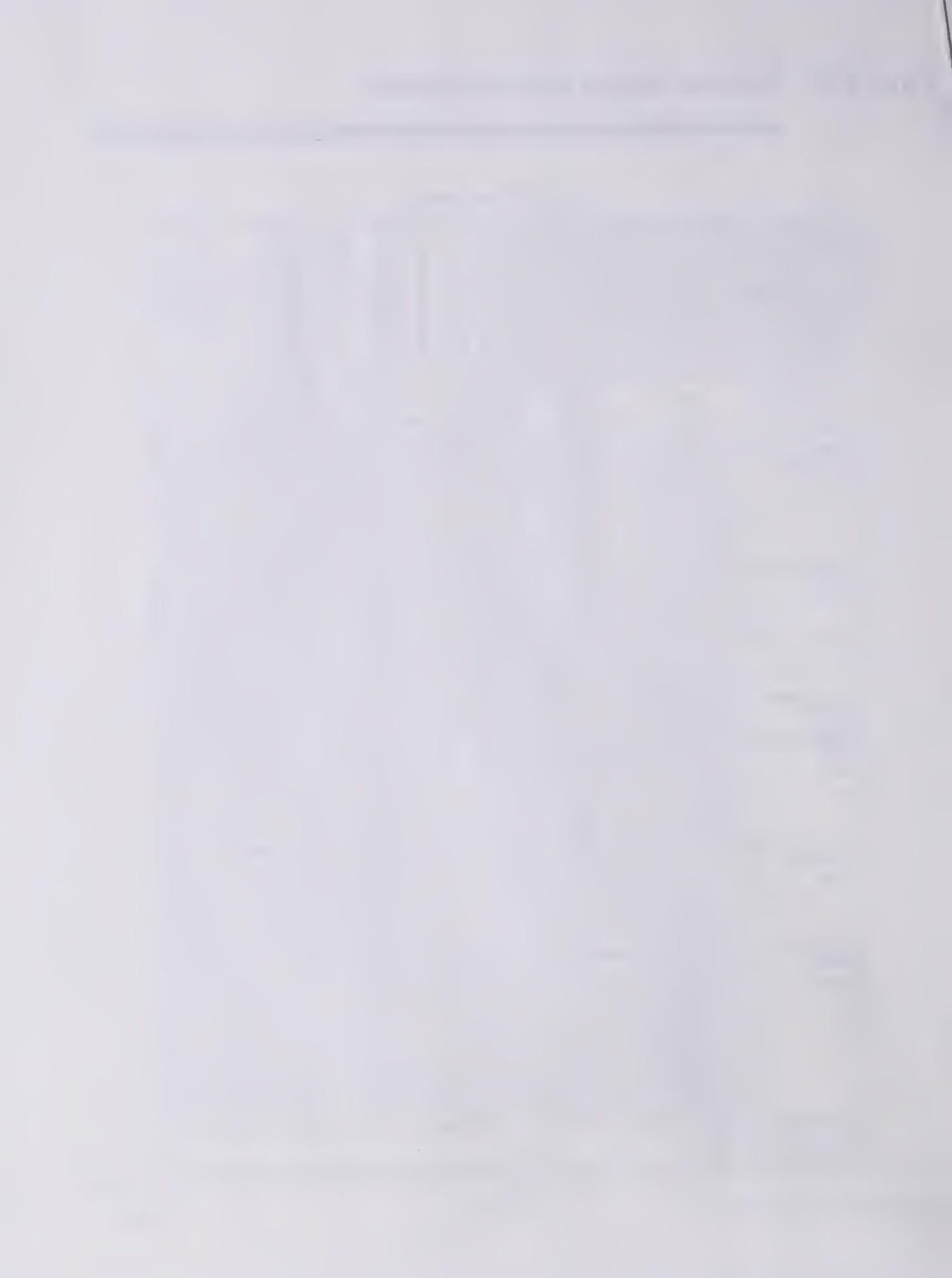
Final FSP Surface Water and Sediment

Table A.8-3, continued

MMR Sediment Samples			Parameters:	Explosives (colorimetric)		Explosives (EPA 8330)		Inorganics:	TOC	Metals, cyanide, NO2/NO3, NH4, Phos.		Other Analytes:	VOC, EDB, MTBE	SVOC	PCB/Pest.	Herbicide
Location	MMR ID	EPA/Ogden ID	Cont:	8oz	8oz	4oz.	8oz						4 oz.	8 oz		
Little Halfway Pond	71SD31AXAX01XA	D31AAA		X	*	X	X					X	X	X	X	
	71SD31BXAX01XA	D31BAA		X	*	X	X					X	X	X	X	
Deep Bottom Pond	71SD26AXAX01XA	D26AAA		X	*	X	X					X	X	X	X	
	71SD26BXAX01XA	D26BAA		X	*	X	X					X	X	X	X	
	71SD26CXAX01XA	D26CAA		X	*	X	X					X	X	X	X	
	71SD26DXAX01XA	D26DAA		X	*	X	X					X	X	X	X	
	71SD26HXAX01XA	D26HAA		X	*	X	X					X	X	X	X	
Cranberry Bog	71SD26EXAX01XA	D26EAA		X	*	X	X					X	X	X	X	
	71SD26FXAX01XA	D26FAA		X	*	X	X					X	X	X	X	
	71SD26GXAX01XA	D26GAA		X	*	X	X					X	X	X	X	
Snake Pond	71SD33AXAX01XA	D33AAA		X	*	X	X					X	X	X	X	
	71SD33BXAX01XA	D33BAA		X	*	X	X					X	X	X	X	
	71SD33CXAX01XA	D33CAA		X	*	X	X					X	X	X	X	
Raccoon Swamp	71SD32AXAX01XA	D32AAA		X	*	X	X					X	X	X	X	
	71SD32BXAX01XA	D32BAA		X	*	X	X					X	X	X	X	
Great Pond	71SD39AXAX01XA	D39AAA				X	X					X	X	X	X	
	71SD39BXAX01XA	D39BAA				X	X					X	X	X	X	
	71SD39CXAX01XA	D39CAA				X	X					X	X	X	X	
	71SD39DXAX01XA	D39DAA				X	X					X	X	X	X	
	71SD39EXAX01XA	D39EAA				X	X					X	X	X	X	
Doughnut Pond	71SD40AXAX01XA	D40AAA				X	X					X	X	X	X	
	71SD40BXAX01XA	D40BAA				X	X					X	X	X	X	
	71SD40CXAX01XA	D40CAA				X	X					X	X	X	X	
	71SD40DXAX01XA	D40DAA				X	X					X	X	X	X	
	71SD40EXAX01XA	D40EAA				X	X					X	X	X	X	
Upper Pond	71SD43AXAX01XA	D43AAA		X	*	X	X					X	X	X	X	
	71SD43BXAX01XA	D43BAA		X	*	X	X					X	X	X	X	
	71SD43CXAX01XA	D43CAA		X	*	X	X					X	X	X	X	
	71SD43DXAX01XA	D43DAA		X	*	X	X					X	X	X	X	
	71SD43EXAX01XA	D43EAA		X	*	X	X					X	X	X	X	
	71SD43FXAX01XA	D43FAA		X	*	X	X					X	X	X	X	
	71SD43GXAX01XA	D43GAA		X	*	X	X					X	X	X	X	
	71SD43HXAX01XA	D43HAA		X	*	X	X					X	X	X	X	

X - Submit for analysis

* - Submit on Hold



Final FSP Surface Water and Sediment

VOC (except background locations)	OLM03.2
SVOC	OLM03.2
Pesticide/PCB	OLM03.2
Herbicide	SW-846 Method 8151
EDB/MTBE (except background locations)	SW-846 Method 8021
Metals & Cyanide	ILM04.0
Phosphorous	365.2
Nitrate	353.2
Ammonia	350.2
TOC	Lloyd Kahn
Explosives Screen (except background locations)	CRREL
Explosives (if detected in screen, except background locations)	SW-846 Method 8330

Detection limits for these analyses are described in the Final Action Plan, Appendix A Quality Assurance/Quality Control Plan (July 1997), and the QA/QC Plan Addendum (August 1997).

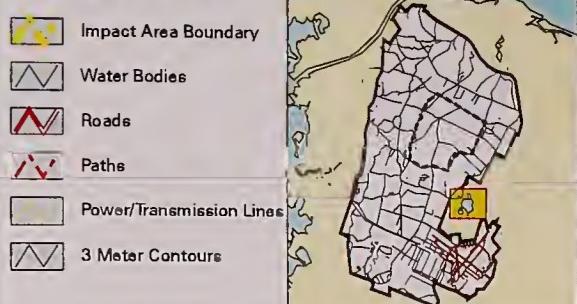
**MMR
Groundwater
Study**

LEGEND

- Wells with GPS Coordinates
- Other Accuracy Source Wells
- Screen Digitized Wells
- Soil Grids with GPS Coordinates
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

LOCATION MAP



NOTES & SOURCES

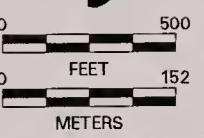
Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

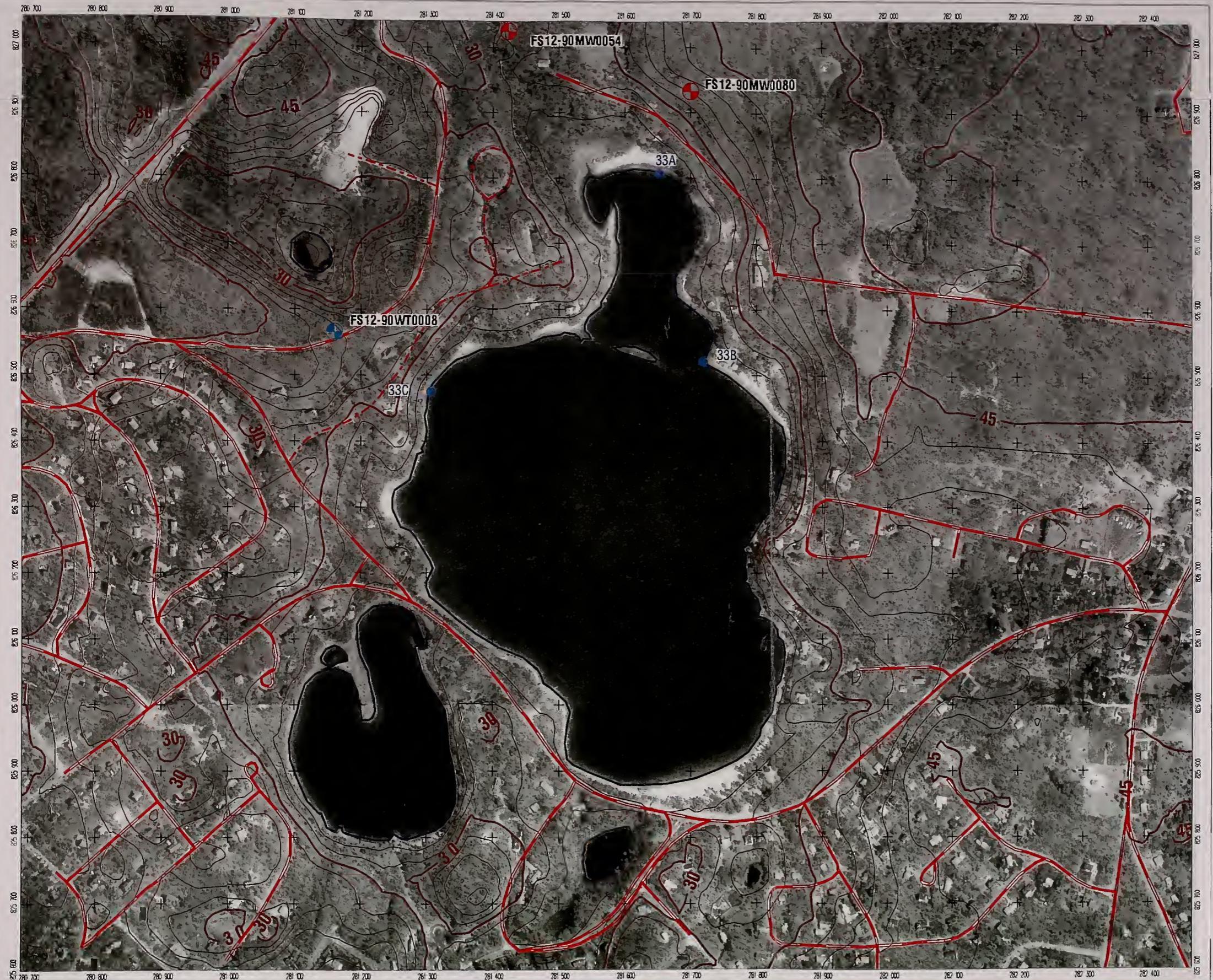
**Sample Area 33
Snake Pond**



FIGURE

A.8-15

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